

Claims

1. A complex oxide having a composition represented by the formula $Ln_{1-x}M_xNiO_y$; wherein Ln is a lanthanide, M is at least one element selected from the group consisting of Na, K, Li, Zn, Pb, Ba, Ca, Al, Bi, and rare earth elements being not the same as Ln; and $0 \leq x \leq 0.8$; and $2.7 \leq y \leq 3.3$, the complex oxide having a negative Seebeck coefficient at $100^{\circ}C$ or higher.
- 10 2. A complex oxide having a composition represented by the formula $Ln_{1-x}M_xNiO_y$; wherein Ln is a lanthanide, M is at least one element selected from the group consisting of Na, K, Li, Zn, Pb, Ba, Ca, Al, Bi, and rare earth elements being not the same as Ln; $0 \leq x \leq 0.8$; and $2.7 \leq y \leq 3.3$, the complex oxide having an electrical resistivity of $1 \Omega\text{cm}$ or less at $100^{\circ}C$ or higher.
- 15 3. A complex oxide having a composition represented by the formula $(Ln_{1-x}M_x)_2NiO_y$; wherein Ln is a lanthanide, M is at least one element selected from the group consisting of Na, K, Li, Zn, Pb, Ba, Ca, Al, Bi, and rare earth elements being not the same as Ln; $0 \leq x \leq 0.8$; and $3.6 \leq y \leq 4.4$, the complex oxide having a negative Seebeck coefficient at $100^{\circ}C$ or higher.
- 20 4. A complex oxide having a composition represented by the formula $(Ln_{1-x}M_x)_2NiO_y$; wherein Ln is a lanthanide, M is at least one element selected from the group consisting of Na, K, Li, Zn, Pb, Ba, Ca, Al, Bi, and rare earth elements being not the same as Ln; $0 \leq x \leq 0.8$, and $3.6 \leq y \leq 4.4$, the complex oxide having an electrical resistivity of $1 \Omega\text{cm}$ or less at $100^{\circ}C$ or higher.
- 25 5. An n-type thermoelectric material comprising the complex oxide of any one of Claims 1 to 4.
- 30 6. A thermoelectric module comprising the n-type thermoelectric material of Claim 5.